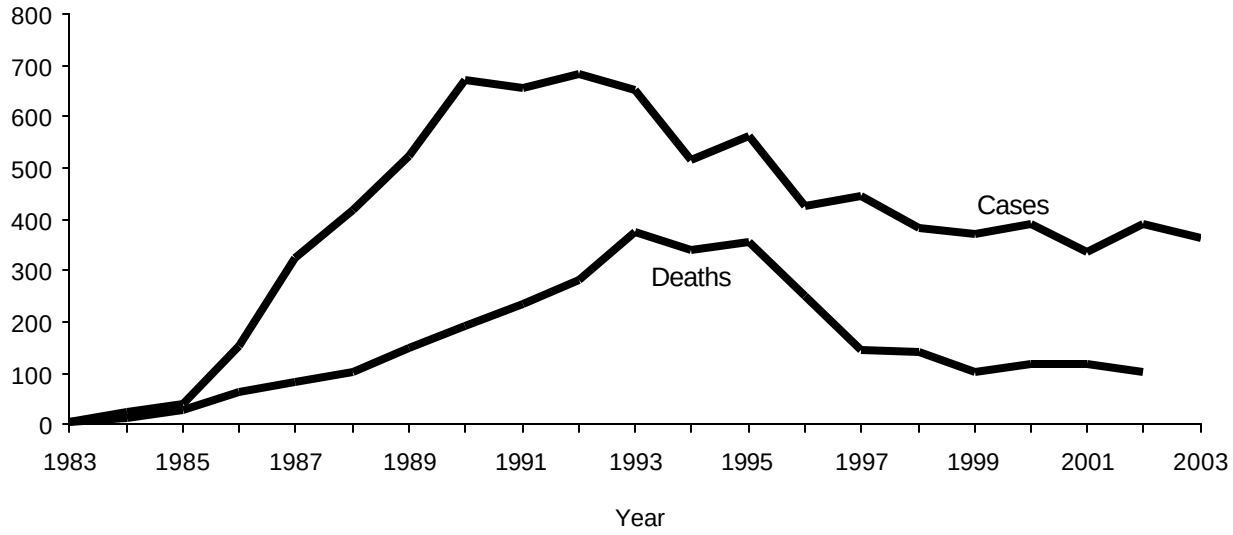
The epidemic of HIV infection in Wisconsin: A review of case surveillance data collected through 2003

Introduction

In the year 2003, 365 new cases of human immunodeficiency virus (HIV) infection[1] were reported in Wisconsin. This brings the total cumulative number of persons reported with HIV infection in Wisconsin to 8,328. Among these cases 5,424 meet the Centers for Disease Control and Prevention (CDC) criteria for AIDS; 2,904 have HIV infection but did not meet the AIDS case definition at the end of 2003.

In Wisconsin, the first cases of HIV infection were reported in 1983, and throughout the 1980's, the annual number of reported cases of HIV infection increased (figure 1). The decade of the 1990's marked a transition in the epidemic. During this decade, the annual number of reported cases reached a peak between 1990 and 1993 (average: 665 cases, range: 650-683) then tended to decline for about five years.

Figure 1. Number of persons reported with HIV infection, by year of report 1983-2003 and number of deaths among persons reported with HIV infection, by year of death 1983-2002, Wisconsin



Since 1998, annual case numbers have fluctuated. In 2001 cases decreased 14% compared to the previous year. In 2002 cases increased 16%, and in 2003 cases decreased 6%. Taken together these observations suggest that these annual case numbers represent variations in an otherwise general leveling that has been ongoing since 1998. Between 1998 and 2003, 372 (range: 336-389) new cases of HIV infection were reported on average each year - a 44% decline compared to the average during the peak years (1990-1993).

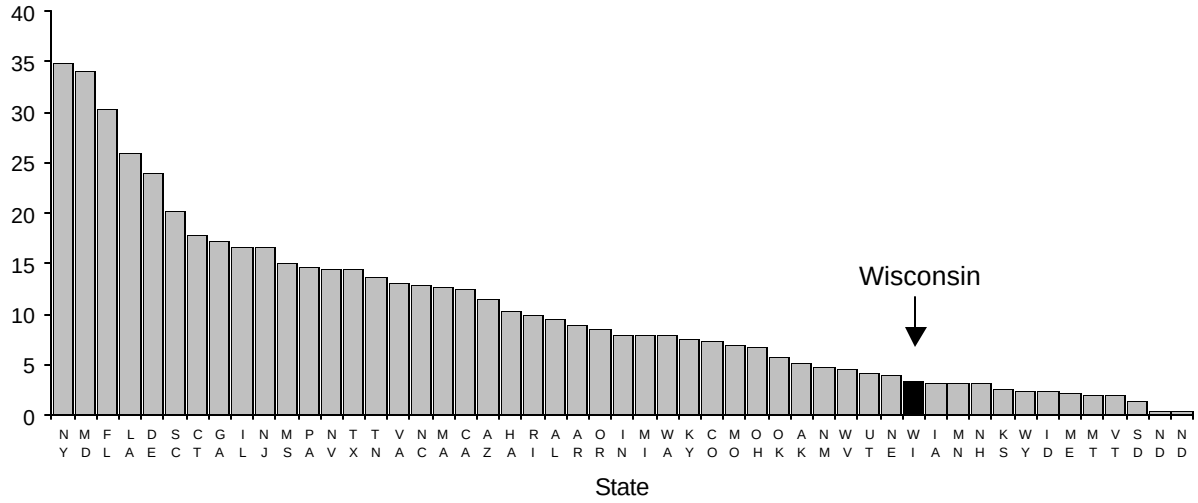
Wisconsin has historically had low AIDS case rates compared to other states. During the year 2002, Wisconsin had the thirteenth lowest AIDS case[2] rate (3.4 AIDS cases per 100,000) in the

[1] In this report, "HIV infection" refers to persons with laboratory confirmed HIV infection regardless of whether or not they meet the CDC AIDS case definition.

[2] To compare HIV-related morbidity between states, it is necessary to use AIDS cases because not all states require reporting of HIV infection.

United States (figure 2). The highest rate was in New York (34.8 AIDS cases per 100,000); the New York rate was ten-fold greater than the rate in Wisconsin.

Figure 2. Annual AIDS rates per 100,000 population, by State, cases reported during 2002, United States



The annual number of known deaths among persons reported with HIV infection in Wisconsin has also declined from the historic peak (figure 1). One hundred four deaths are known to have occurred in 2002, a 72% decline compared to the 373 deaths the peak year 1993.[3] As a result of declining deaths, the number of persons reported with HIV that are presumed alive has continually increased (figure 3). Over the past five years (1999-2003) this increase has averaged 4% per year. At the end of 2003, 5,027 persons reported with HIV infection in Wisconsin were presumed to be alive, an all-time high; 3,301 persons reported with HIV infection are known to have died.

HIV infection has been reported from throughout Wisconsin, but the effect of the epidemic has not been the same for all populations. Understanding how HIV has been distributed within the population is important for targeting future HIV prevention and care resources to populations at risk of HIV infection. In this report, the distribution of the epidemic is analyzed by risk exposure, age, sex, race/ethnicity, and geographic region.

Risk exposure groups

Men who have sex with men

A majority (52%) of reported cases of HIV infection in Wisconsin has been among men who have sex with men (MSM) (table 1). The MSM percentage was highest early in the epidemic; among persons reported with HIV infection in the 1980's, 59% were MSM (figure 4). MSM continue to be the largest single risk exposure category, however, the percentage of cases attributed to MSM has declined. Between 1990 and 1999, 53% of HIV infection cases reported in Wisconsin were among MSM; among persons reported with HIV infection between 2000 and 2003, 44% were MSM.

[3] Due to delays in reporting of deaths, an accurate estimate of total deaths in 2003 is not yet available.

Figure 3. Number of persons reported with HIV infection and presumed alive at years end, Wisconsin, 1983-2003

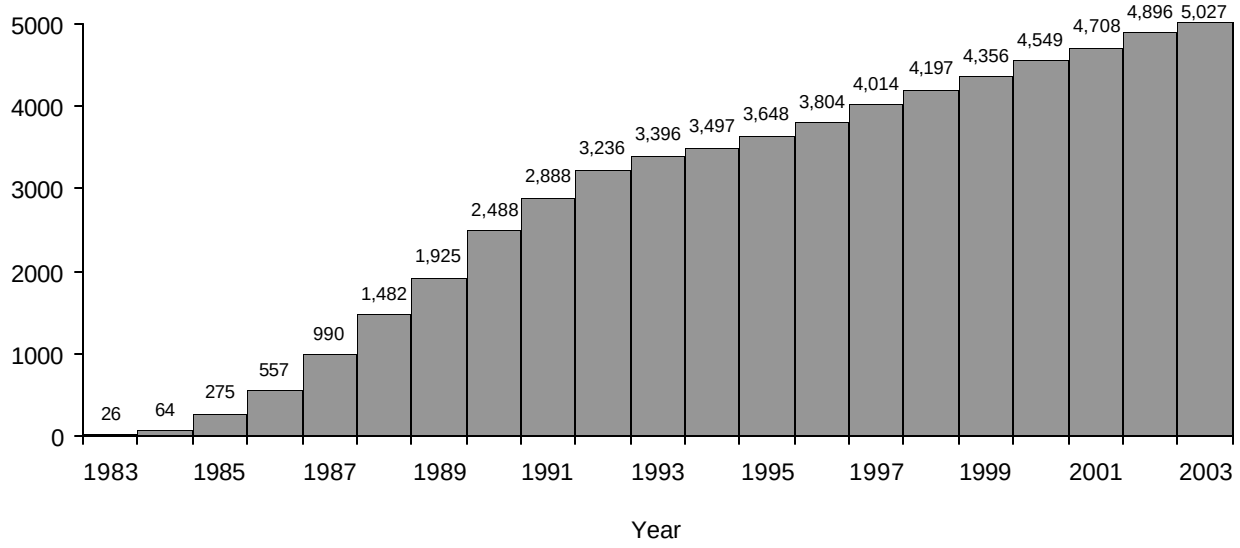


Table 1. Cumulative reported HIV cases by risk exposure category, cases reported through 2003

Risk exposure category	No.		%
Men who have sex with men (MSM)	4,350		52%
Injection drug users (IDU)	1,229		15%
MSM & IDU	552		7%
Hemophilia	118		1%
Heterosexual contact	979		12%
Sex with an IDU		*481*	
Sex with HIV+ partner risk unspecified		*394*	
Sex with other high risk partner		*104*	
Transfusion recipient	78		<1%
Mother at risk	76		<1%
Unknown	946		11%
Total	8,328		100%

An additional 7% of all persons reported with HIV infection are in the risk exposure category of men who have sex with men who also inject drugs (MSM & IDU). The proportion of reported HIV infection cases in this category was 7% prior to 1990, 7% between 1990 and 1999 and 5% among cases reported between 2000 and 2003 (figure 4).

The number of cases of HIV infection by year of report and risk exposure is shown in figure 5. MSM cases peaked in the early 1990's; between 1990 and 1993 an average of 383 MSM cases were reported each year. MSM cases declined in the mid-1990's. Provisional risk exposure data indicates that HIV cases among MSM have leveled in recent years. Between 1999 and 2003 an average of 163 cases (range: 148-184) have been reported each year, a 57% decline from the peak years (1990-1993).

Figure 4. Comparison of risk exposure category distribution for HIV infection cases reported during three time periods, Wisconsin

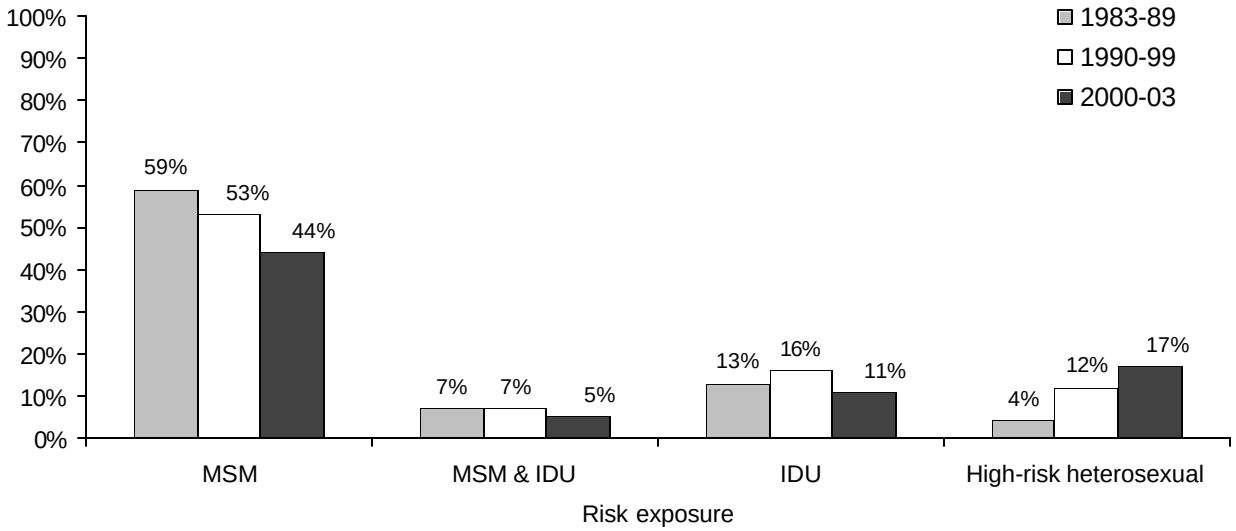
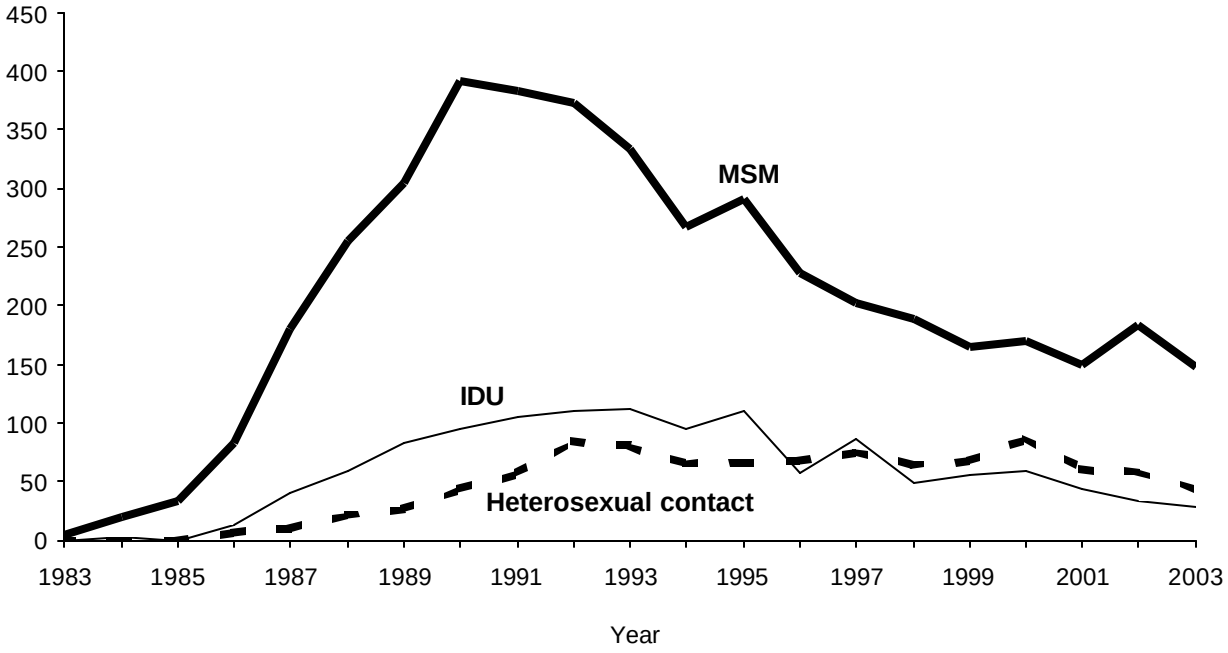


Figure 5. Number of persons reported with HIV infection, by risk exposure* and year of report 1983-2003, Wisconsin



* MSM may be under-estimated in case surveillance data; this effect may be greatest in the most recent year.

Interpreting trends in reported HIV infection among MSM and other risk exposures is complicated because some cases are initially reported without a risk exposure. This may be due to lack of acknowledgment of risk by patients, incomplete reporting by clinicians, or to reporting restrictions. The net effect is that MSM and other risk exposures may be under-estimated in case surveillance data and this effect may be greatest in the most recent years.

Injection Drug Use

Injection drug use among non-MSM populations (IDU) is the second most common risk exposure category for persons reported with HIV infection in Wisconsin representing 15% of all cases (table 1). Over the course of the epidemic, the percentage of HIV infection cases among injection drug users has fluctuated. Among persons reported with HIV infection in the 1980's, 13% were injection drug users; between 1990 and 1999 this proportion was 16% (figure 4). Among persons reported with HIV infection between 2000 and 2003, 11% were injection drug users.

The number of IDU reported with HIV infection peaked between 1991 and 1995. During that period an average of 106 IDU cases were reported each year (figure 5). Cases reported among IDU declined in the late 1990's. Provisional risk exposure data indicates that between 2000 and 2003, 40 cases were reported each year on average. This is a 62% decline compared to peak years (1991-1995).

Heterosexual Contact

For the risk exposure category to be classified as heterosexual contact, it must be documented that an infected individual had heterosexual contact with a partner known to be at high risk of HIV infection.

In Wisconsin, 12% of all persons reported with HIV infection had heterosexual contact as their risk exposure category (table 1). The percentage of Wisconsin HIV infection cases classified in this exposure category has increased. Among persons reported with HIV infection in the 1980's, 4% were classified as heterosexual contact compared to 12% among cases reported between 1990 and 1999 and 17% between 2000 and 2003 (figure 4). Heterosexual HIV transmission is closely linked to drug injection. In Wisconsin nearly half (49%) of persons in the heterosexual contact category were so classified because they had an injection drug user as a sex partner.

During the mid-to-late 1990s the number of reported heterosexual contact cases was relatively constant (figure 5). Provisional risk exposure data indicates that between 1992 and 2000, 73 cases (range: 64-87) were reported each year on average. Since then, the number newly reported cases of heterosexual contact HIV infection declined. Between 2000 and 2003, 54 cases of heterosexual contact cases were reported each year on average. Thus, while in recent years the percentage of cases attributed to heterosexual contact has increased; the absolute number of cases in this risk exposure category has not.

Less common risk exposures

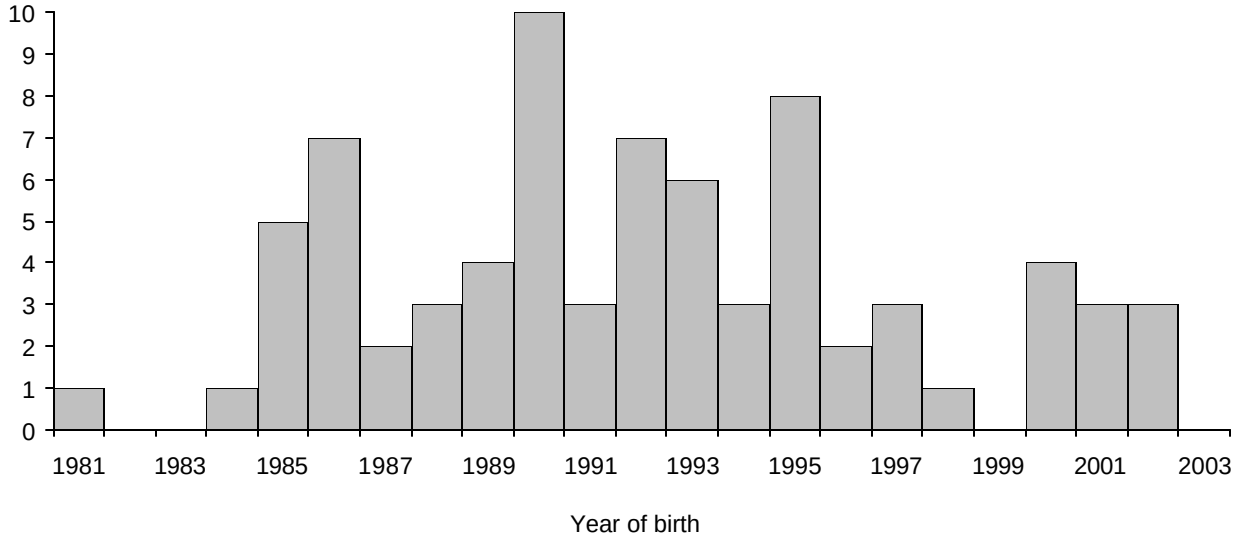
Overall in Wisconsin 1% of reported HIV infection cases have been among persons with hemophilia and less than 1% among blood transfusion recipients (table 1). Early in the epidemic, HIV transmission occurred among persons with hemophilia and among transfusion recipients who received contaminated blood products. However, since screening of the blood supply began in 1985, HIV transmission among persons with hemophilia and transfusion recipients has been very rare. As a result, the number of HIV infection cases reported among persons whose risk exposure category was either hemophilia or blood transfusion declined from an average of 19 cases per year between 1986 and 1993 to 1 case per year between 2000 and 2003.

In Wisconsin, 76 persons reported with HIV infection are classified in the "mother at risk" risk exposure category; this represents less than 1% of all reported cases of HIV infection (table 1). A case is classified in this category if exposure to HIV occurred during the perinatal period, i.e. a child born to an HIV infected mother. In Wisconsin, HIV infection among children in this category

is closely linked to injection drug use; 58% of children with perinatally transmitted HIV infection were born to mothers who either had a history of injection drug use or who were a sex partner of an injection drug user.

Nationwide, the number of children born with HIV infection has declined as a result of treatments that reduce the likelihood of perinatal HIV transmission. Figure 6 shows reported "mother at risk" cases of HIV infection in Wisconsin by the year of the child's birth. Cases were highest among children born in the late 1980s and early 1990s and have since declined. Ten cases have been reported among children born between 2000 and 2003.

Figure 6. Number of children reported with HIV infection whose risk exposure category is "Mother at Risk" by year of birth, Wisconsin, cases reported through 2003

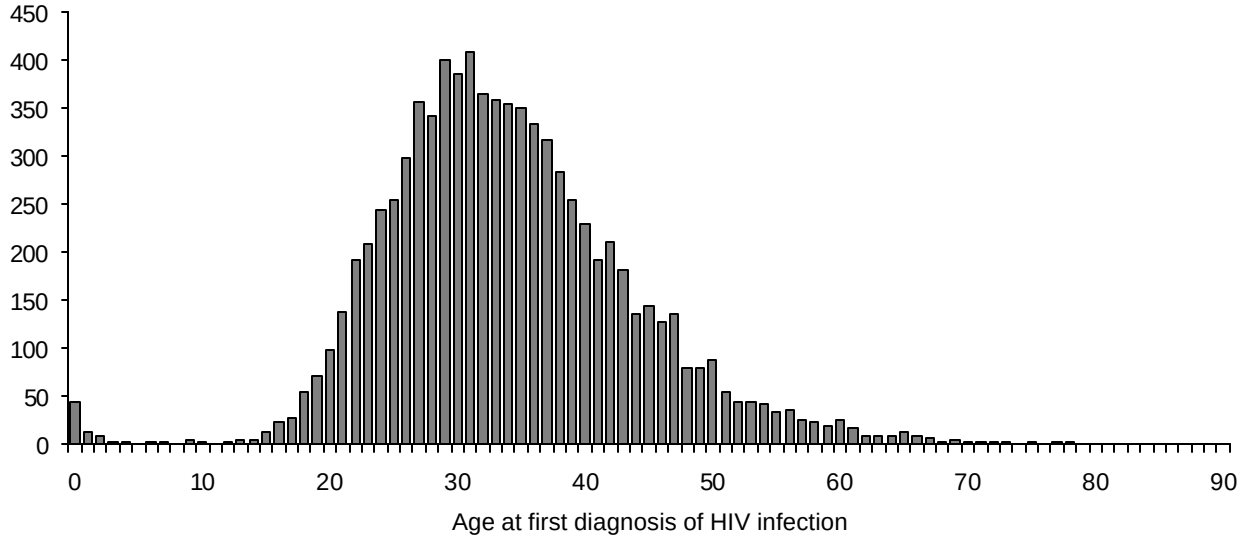


Age

Understanding the ages at which persons are most at risk for HIV infection is crucial for HIV prevention planning. In this profile, reported cases of HIV infection are categorized into three age groups based on age at the time of first diagnosis of HIV infection. These categories are children less than age 15 years, youth 15 to 24, and adults 25 or older.

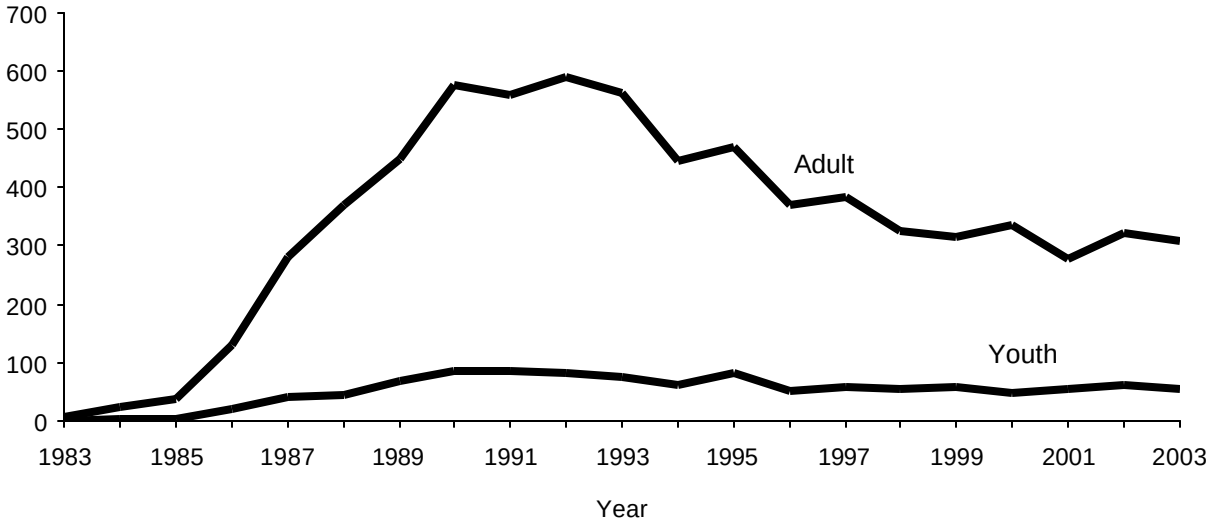
Among all cases reported, the median age at diagnosis of HIV infection is 33 years (figure 7). Most HIV infected persons (86%) were adults when they were first diagnosed with HIV infection; 13% were youth and 1% were children. It is important to note, however, that the age at diagnosis of HIV infection is not usually the age when HIV infection was acquired. HIV infected persons often experience a long period during which they appear and feel healthy; allowing HIV infection to remain undiagnosed for years. Thus, some persons first diagnosed with HIV infection after the age of 25 were likely infected before that age. The Centers for Disease Control and Prevention estimates that in the United States at least one half of all persons with HIV infection in the U.S. acquired the disease before they were 25 years old.

Figure 7. Age at time of first diagnosis of HIV infection, Wisconsin, cases reported through 2003



While most of the overall decline in reported HIV infection has occurred among adults, cases reported among youth have also declined from historic peaks (figure 8). The highest number of cases reported among youth 15-24 years of age occurred between 1990 and 1992. During that time on average 84 persons 15-25 years of age were reported each year. In the mid-1990's the number of cases reported among youth declined and then subsequently leveled. Between 2000 and 2003, on average, 54 cases of HIV infection among youth were reported each year.

Figure 8. HIV infections by year of report and for youth (15-24 years of age) and adults (more than 24 years of age), Wisconsin, cases reported through 2003



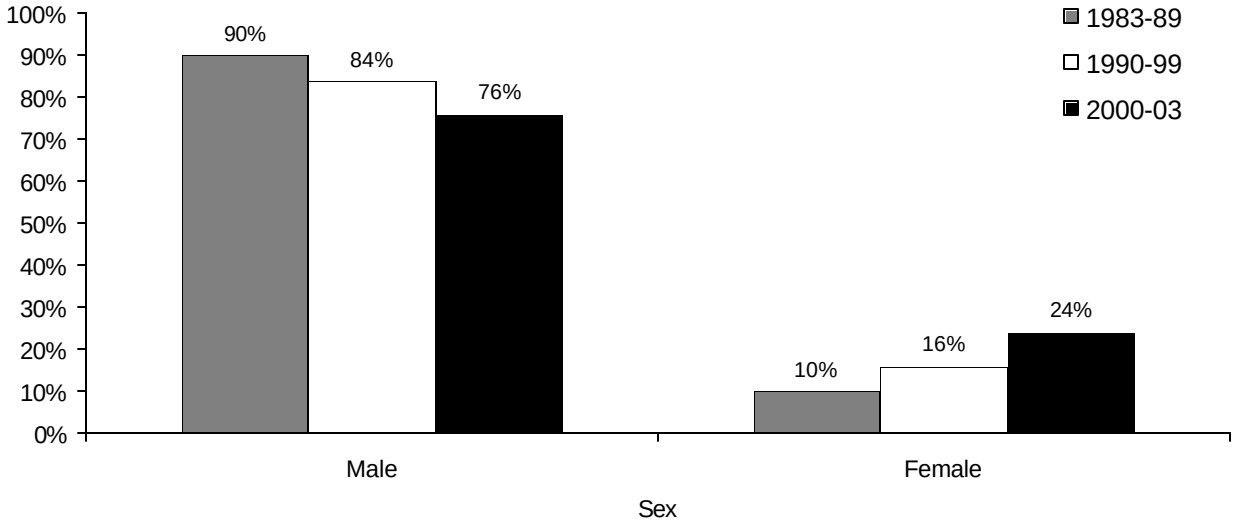
Sex

Although historically most (84%) persons reported with HIV infection in Wisconsin are male (table 2), the percentage of cases reported among females has progressively increased over time (figure 9). During the 1980's, 10% of persons reported with HIV infection were females; among persons reported between 1990 and 1999, 16% were females. This proportion increased to 24% among persons reported with HIV infection between 2000 and 2003.

Table 2. Cumulative reported HIV infection by sex, cases reported through 2003

	Total cases		Deaths		Living cases	
Sex	**No.**	**%**	**No.**	**%**	**No.**	**%**
Male	6,978	84%	2,947	89%	4,031	80%
Female	1,350	16%	354	11%	996	20%
Total	8,328	100%	3,301	100%	5,027	100%

Figure 9. Comparison of the sex of cases of HIV infection reported during three time periods, Wisconsin, cases reported through 2003



Since the early 1990s, there has been a steady decline in the number of cases of HIV reported among males in Wisconsin (figure 10). Between 2000 and 2003, an average of 282 males were reported with HIV infection representing a 53% decline compared to 598 cases reported in 1990, the peak year.

The number of reported cases of HIV infection among females was highest between 1992 and 1993 when an average of 110 cases were reported each year. The number of cases reported among females declined in 1994 and has been relatively level since. Between 1994 and 2003 on average 83 cases (range: 70-97) of HIV infection were reported among females each year. Thus, the increase in the proportion of reported cases of HIV infection attributed to females has not been a result of increasing cases among females, but rather can be attributed to the large decrease in cases among males.

Heterosexual contact is the most frequently reported risk exposure for females reported with HIV infection in Wisconsin. Injection drug use is the second most frequent risk exposure reported. Among females reporting heterosexual contact, nearly half (48%) had a heterosexual partner who was an injection drug user.

Figure 10. HIV infections by sex and year of report, Wisconsin, cases reported through 2003

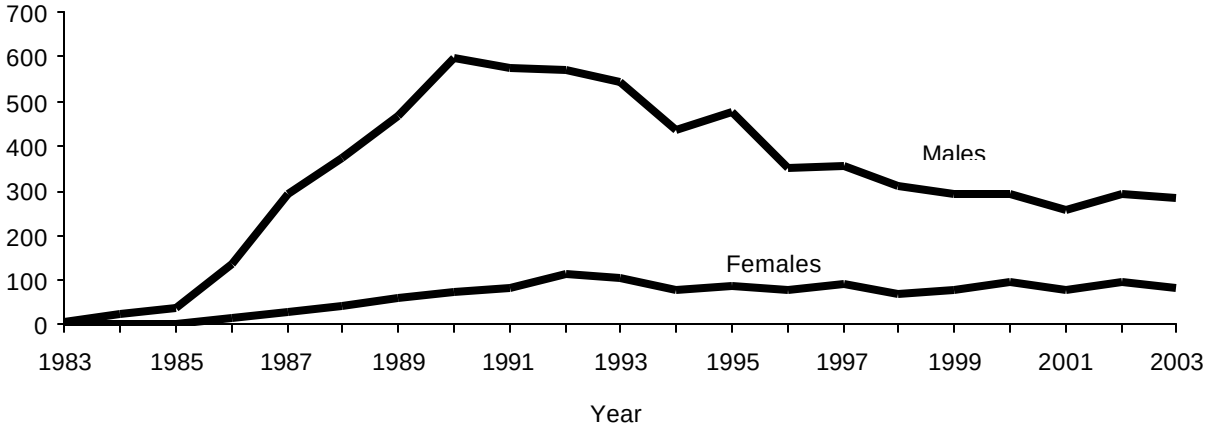


Table 3. Cumulative reported HIV cases by sex and risk exposure category, cases reported through 2003

	Males		Females	
Risk exposure category	**No.**	**%**	**No.**	**%**
Men who have sex with men (MSM)	4,350	62%	-	-
Injection drug users (IDU)	877	13%	352	26%
MSM & IDU	552	8%	-	-
Hemophilia	118	2%	0	0%
Heterosexual contact	286	4%	693	51%
Transfusion recipient	41	0.6%	37	3%
Mother at risk	37	0.5%	39	3%
Unknown	717	10%	229	17%
Total	6,978	100%	1,350	100%

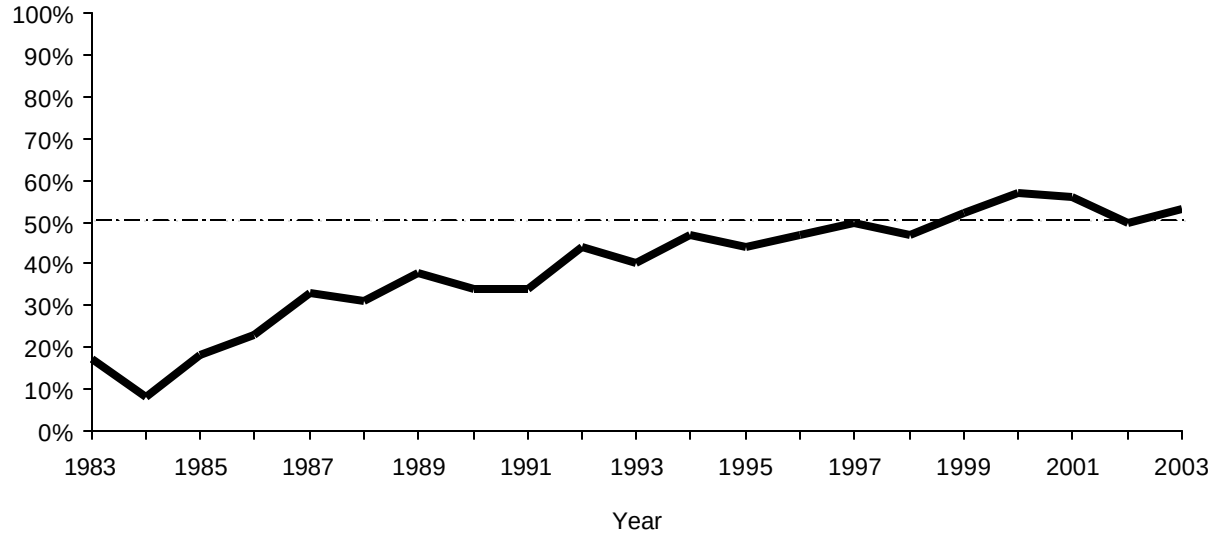
Race/ethnicity

Most (57%) persons who have been reported with HIV infection in Wisconsin are non-Hispanic white (table 4). However, throughout the epidemic the percentage of reported cases attributed to racial/ethnic minorities has increased (figure 11). In 1999, for the first time more than one half of all cases of HIV infection reported in Wisconsin were among racial/ethnic minorities. Between 2000 and 2003, 54% of reported cases of HIV infection in Wisconsin were among racial/ethnic minorities.

Table 4. Cumulative reported HIV infection by race/ethnicity, cases reported through 2003

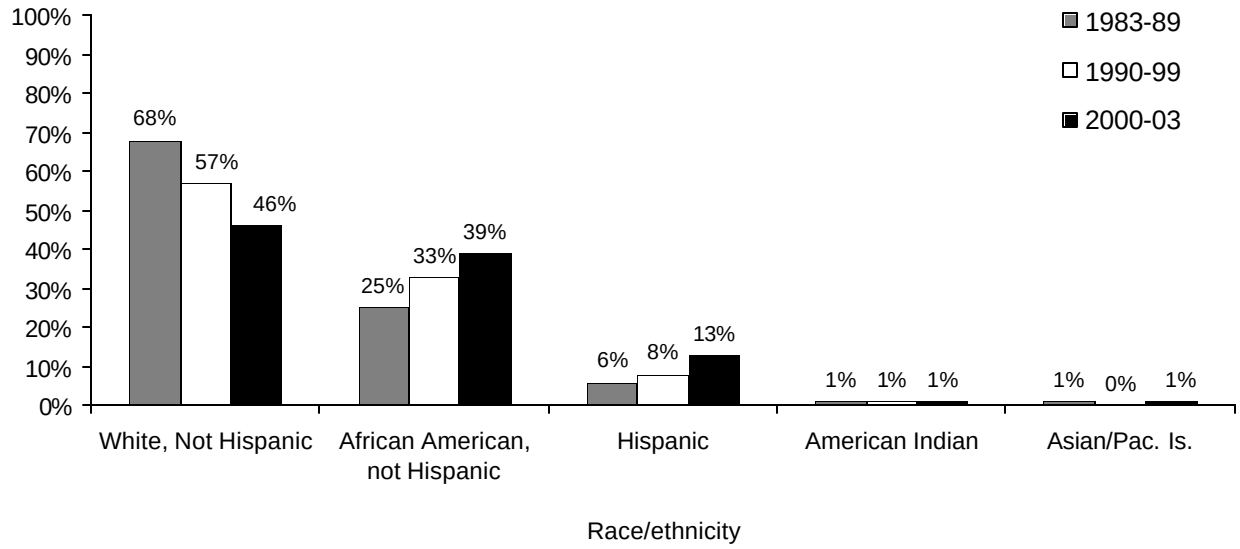
	Total cases		Deaths		Living cases	
Race/ethnicity	**No.**	**%**	**No.**	**%**	**No.**	**%**
White, not Hispanic	4,750	57%	2,235	68%	2,515	50%
African American, not Hispanic	2,743	33%	825	25%	1,918	38%
Hispanic	712	9%	205	6%	507	10%
American Indian	76	1%	31	1%	45	1%
Asian/Pacific Islander	39	0%	10	0%	29	1%
Multi-racial	4	0%	1	0%	3	0%
Unknown	4	0%	3	0%	1	0%
Total	8,328	100%	3,310	100%	5,018	100%

Figure 11. Percentage of cases of HIV infection among racial/ethnic minorities by year of report, Wisconsin, cases reported through 2003



Percentage increases among non-Hispanic African Americans and Hispanics account this for trend. In the 1980's, 25% of persons reported with HIV infection were non-Hispanic African American, between 1990 and 1999 this percentage increased to 33% (figure 12). Among persons reported with HIV infection between 2000 and 2003, 39% were non-Hispanic African American. Likewise, the percentage of cases reported among Hispanics increased from 6% during the 1980's, to 8% between 1990 and 1999, and to 13% between 2000 and 2003.

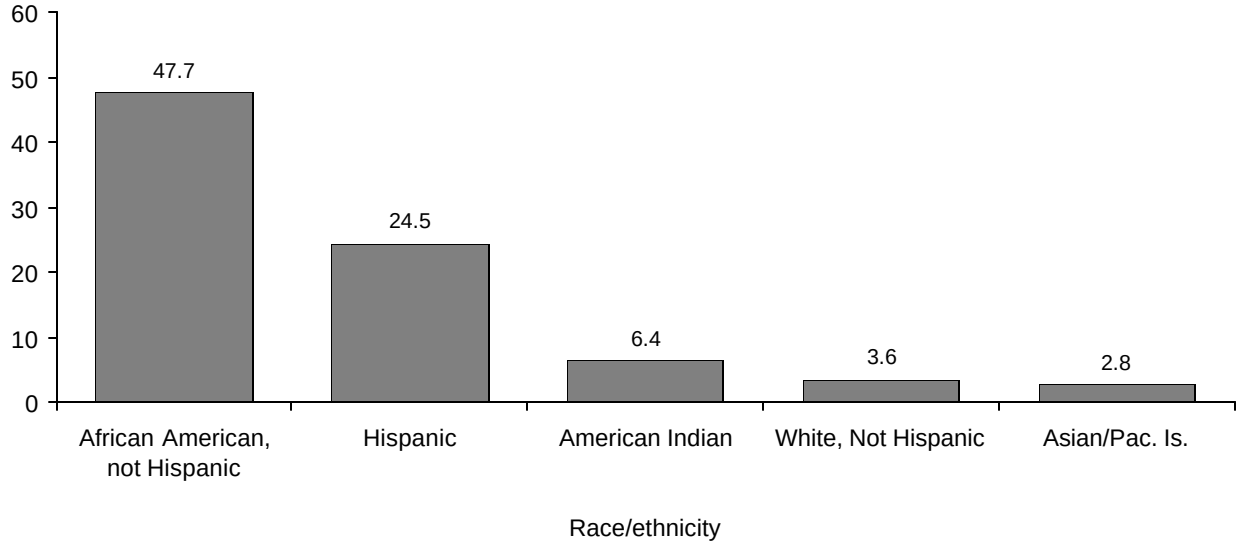
Figure 12. Comparison of the race/ethnicity of cases of HIV infection reported during three time periods, Wisconsin, cases reported through 2003



Although more than one-half of newly reported cases of HIV infection in Wisconsin have been among racial/ethnic minorities, racial/ethnic minorities comprise only about 12% of the Wisconsin population. This disparity results in HIV infection rates (i.e., cases per 100,000 population) that are higher for non-Hispanic African Americans, Hispanics, and American Indians than for Non-Hispanic whites (figure 13). Between 2000 and 2003, the average annual rate was 13-fold greater for Non-Hispanic African Americans, seven-fold greater for Hispanics,

and nearly two-fold greater for American Indians compared to the rate among non-Hispanic whites.

Figure 13. Average annual rate of reported HIV infection per 100,000 population, by race/ethnicity, Wisconsin, cases reported 2000-2003



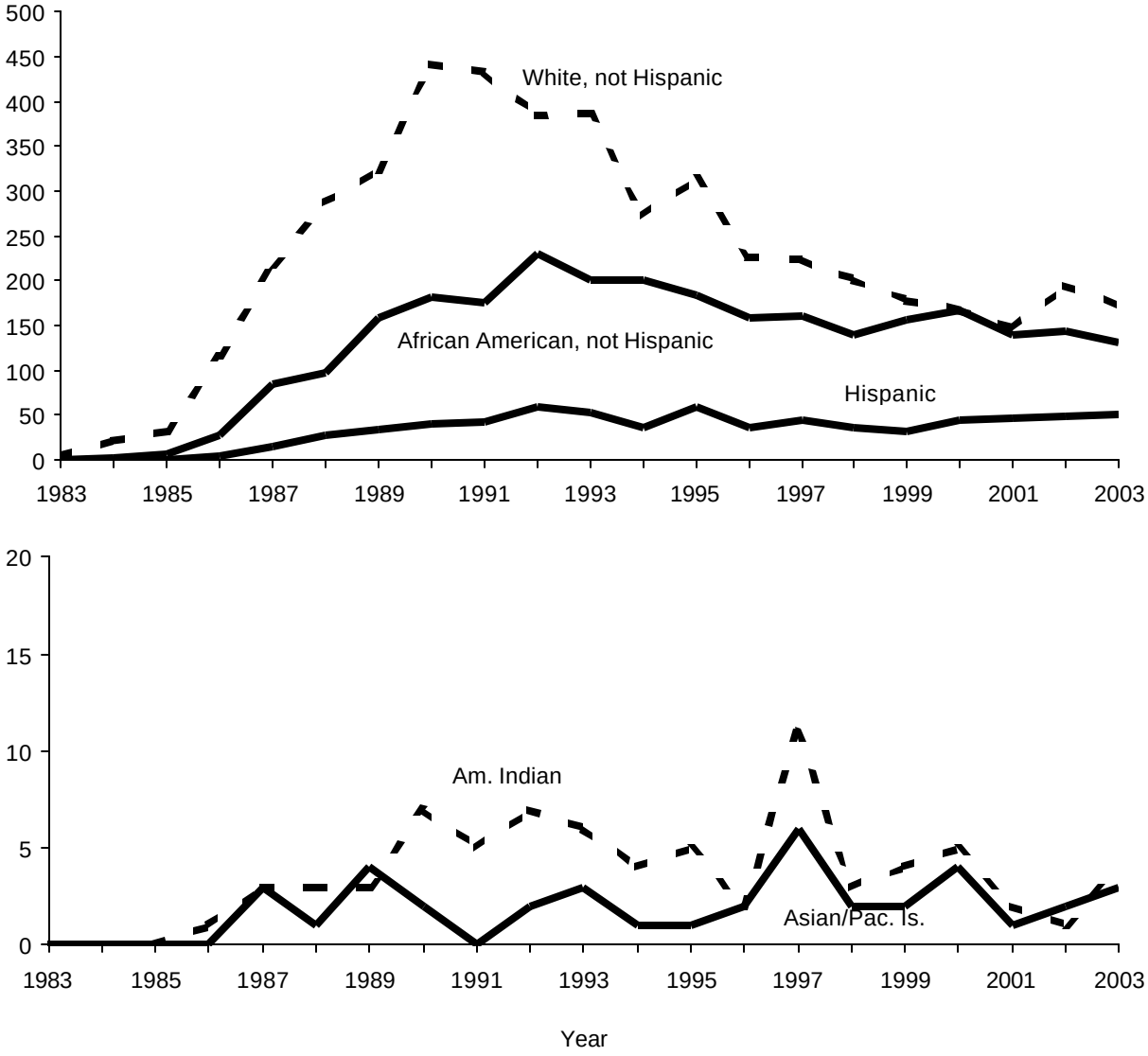
Among non-Hispanic whites, there was a substantial decrease in the annual number of cases of HIV infection over the past decade (figure 14). An average of 170 cases were reported among non-Hispanic whites between 2000 and 2003, 62% less than the 442 cases reported in 1990, the peak year.

Reported cases of HIV infection among non-Hispanic African Americans and Hispanics have also declined from peaks in the early 1990's (figure 14). Among non-Hispanic African Americans, cases declined 37%, from a peak of 230 in 1992 to an average of 145 cases per year between 2000 and 2003. Among Hispanics, cases declined 20% from a peak of 59 in 1992 to an average of 47 cases per year between 2000 and 2003. Thus, the increase in the proportion of reported cases of HIV infection attributed to racial/ethnic minorities has not resulted from increasing cases among racial/ethnic minorities, but rather can be attributed to the large decrease in cases among non-Hispanic whites.

In Wisconsin, risk exposures reported by persons with HIV infection vary by race/ethnicity. Racial/ethnic minorities with HIV infection more frequently report injection drug use and heterosexual contact as risk exposures than do non-Hispanic whites. Injection drug use is the risk exposure for 23% of non-Hispanic African Americans and 30% of Hispanics reported with HIV infection compared to 8% of non-Hispanic whites (table 5). Likewise, the percentage of reported HIV cases attributed to heterosexual contact is 17% for non-Hispanic African Americans and 21% for Hispanics compared to 7% for non-Hispanic whites.

Non-Hispanic whites with HIV infection more frequently report male-male sexual contact as a risk exposure than do racial/ethnic minorities. Two-thirds (67%) of reported HIV infection cases among non-Hispanic whites have been among MSM, compared to 35% among non-Hispanic African Americans and 29% among Hispanics.

Figure 14. HIV infections by race/ethnicity and year of report, Wisconsin, cases reported through 2003



Geographic categories

In this report, counties are classified into four geographic categories, the Milwaukee Metropolitan Statistical Area (MSA),[4] the Dane County MSA[5], other counties designated as metropolitan by the U.S. Census Bureau,[6] and all non-metropolitan counties.[7]

HIV infection has occurred throughout Wisconsin; cases have been reported from all of the 72 counties in Wisconsin. More than one-half (54%) of cases, however, have been reported from

[4]The Milwaukee MSA includes Milwaukee, Ozaukee, Washington and Waukesha counties.
[5]The Dane County MSA includes only Dane County.
[6]Other Wisconsin counties designated as metropolitan by the U.S. Census Bureau are Kenosha, Racine, Rock, Sheboygan, Brown, Outagamie, Winnebago, Calumet, La Crosse, Marathon, Eau Claire, Chippewa, St. Croix, and Douglas counties.
[7]All counties not included in other categories.

the Milwaukee MSA (table 6). The percentage of reported cases of HIV infection attributed to each geographic region has been similar throughout the epidemic (figure 15).

Table 5. Cumulative reported HIV cases by risk exposure category and race/ethnicity, cases reported through 2003

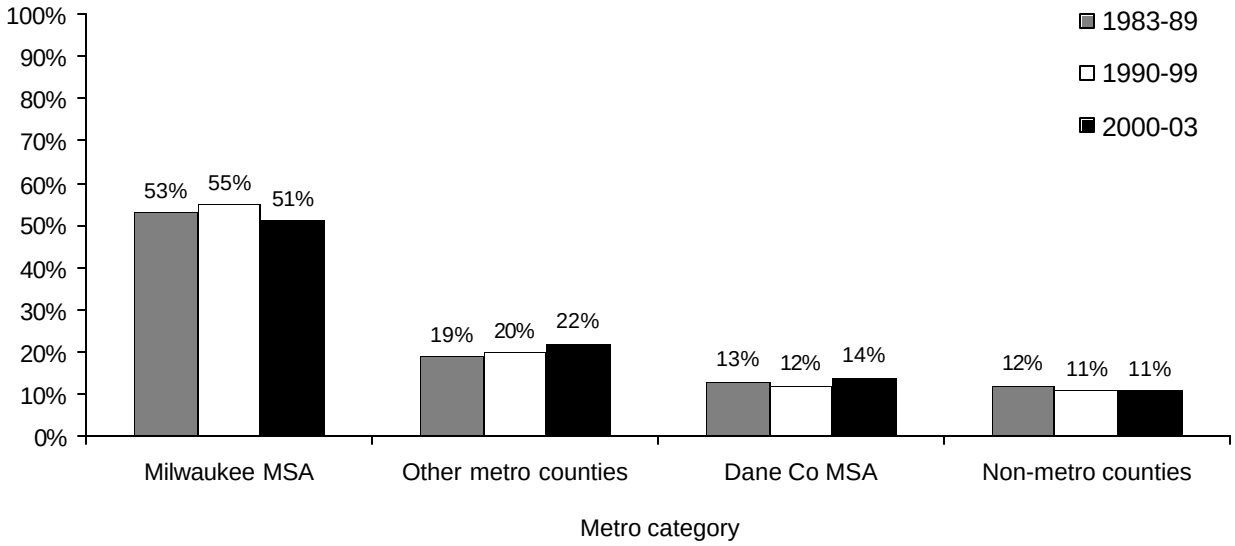
	White, not Hispanic		African Am., not Hispanic		Hispanic	
Risk exposure	**No.**	**%**	**No.**	**%**	**No.**	**%**
Men who have sex with men (MSM)	3,165	67%	947	35%	205	29%
Injection drug users (IDU)	359	8%	633	23%	215	30%
MSM & IDU	326	7%	179	7%	38	5%
Hemophilia	110	2%	5	0%	1	0%
Heterosexual contact	342	7%	461	17%	147	21%
Transfusion recipient	65	1%	8	0%	5	1%
Mother at risk	21	0%	35	1%	15	2%
Unknown	362	8%	475	17%	86	12%
Total	4,750	100%	2,743	100%	712	100%

	Am. Indian		Asian	
Risk exposure	**No.**	**%**	**No.**	**%**
Men who have sex with men (MSM)	18	24%	15	38%
Injection drug users (IDU)	21	28%	1	3%
MSM & IDU	8	11%	0	0%
Hemophilia	1	1%	1	3%
Heterosexual contact	17	22%	10	26%
Transfusion recipient	0	0%	0	0%
Mother at risk	5	7%	0	0%
Unknown	6	8%	12	31%
Total	76	100%	39	100%

Table 6. Cumulative reported HIV infection by geographic region, cases reported through 2003

	HIV infection		Deaths		Living HIV	
Geographic region	**No.**	**%**	**No.**	**%**	**No.**	**%**
Milwaukee MSA	4,498	54%	1,736	53%	2,762	55%
Other metro counties	1,673	20%	689	21%	984	20%
Dane Co. MSA	1,015	12%	378	11%	637	13%
Non-metro counties	922	11%	441	13%	481	10%
Corrections	217	3%	56	2%	161	3%
Unknown	3	0%	1	0%	2	0%
Total	8,328	100%	3,301	100%	5,027	100%

Figure 15. Comparison of the geographic distribution cases of HIV reported during three time periods, non-correctional cases, Wisconsin, cases reported through 2003



Average annual rates of HIV infection are highest in the Milwaukee MSA and the Dane County MSA (figure 16). Lowest rates have been in the more rural, non-metropolitan counties. During 2000 to 2003, the average annual rate of reported HIV infection was five-fold higher in the Milwaukee MSA and the Dane County MSA, and two-fold higher in other metropolitan counties compared to the rate in non-metropolitan counties.

Compared to peak years, there has been a decline in the number of cases of HIV infection reported from each geographic category (figure 17). The greatest decreases have occurred in the Milwaukee MSA.

Figure 16. Average annual rate per 100,000 population of reported HIV infection, by geographic region, Wisconsin, cases reported 2000-2003

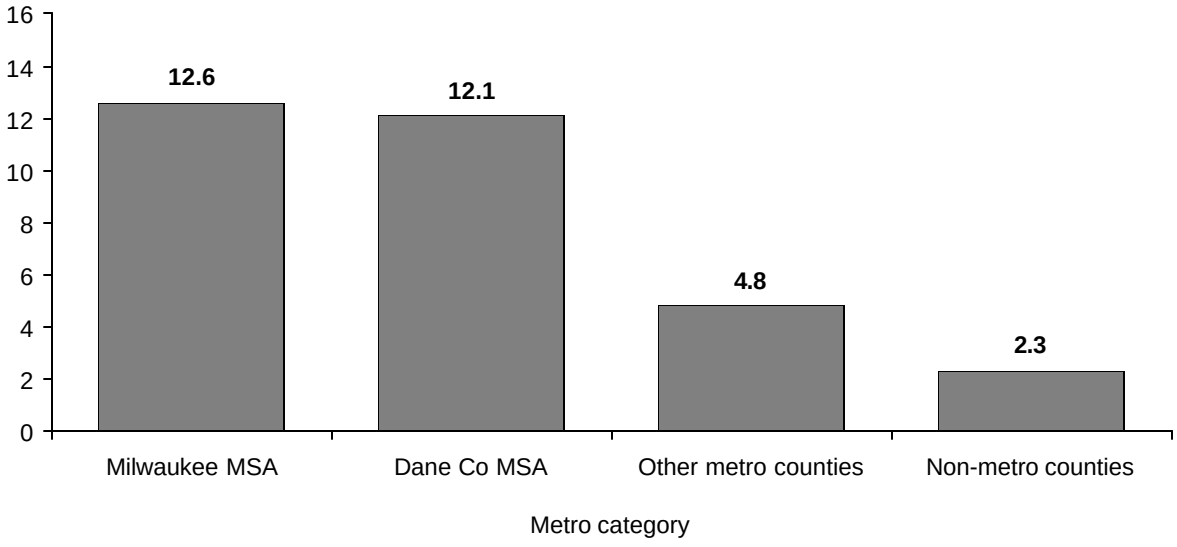
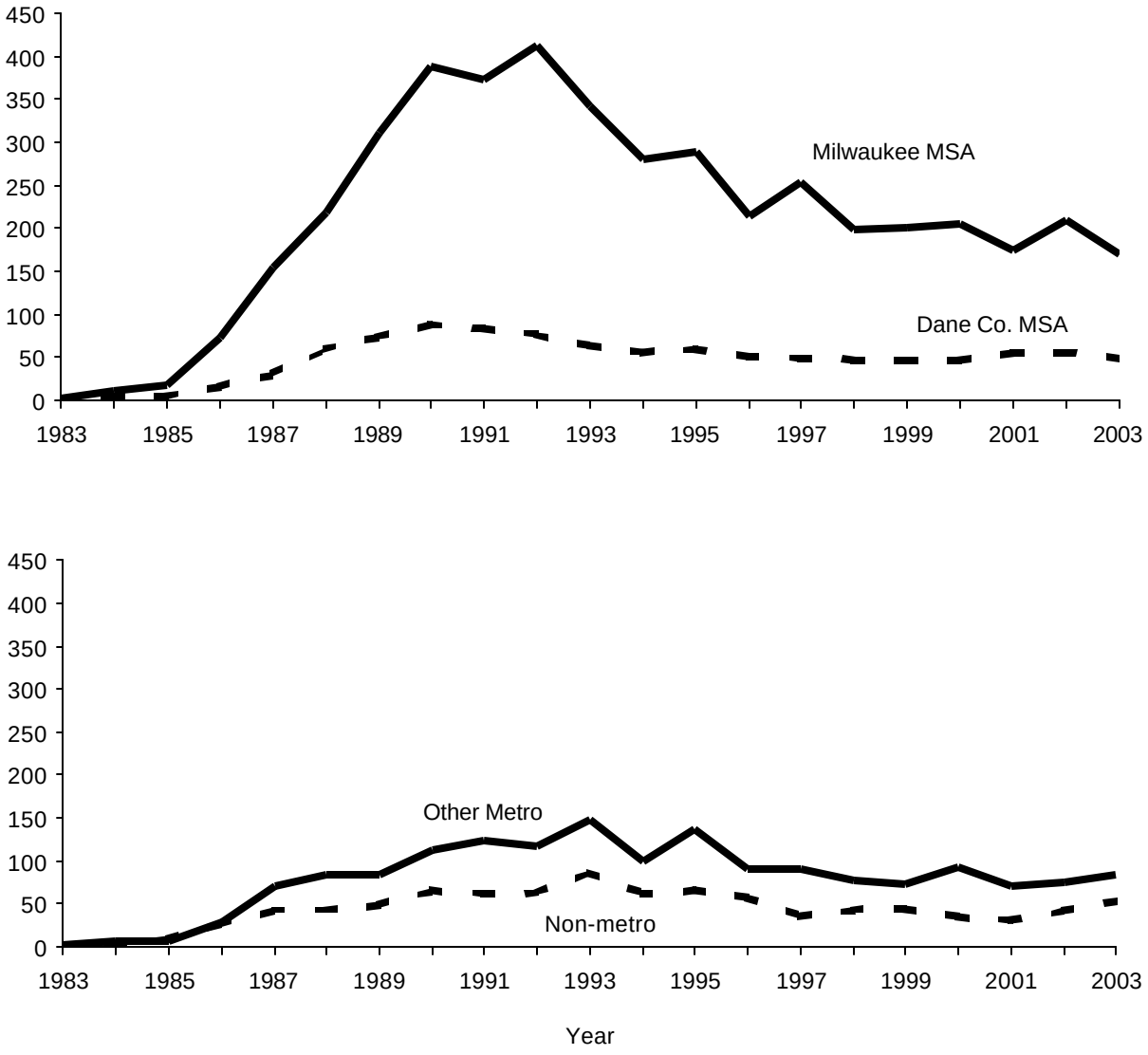


Figure 17. HIV infections by year of report and by geographic region, Wisconsin, cases reported through 2003



For a downloadable slides that accompany this profile and other information about the epidemiology, prevention and care and treatment of HIV infection in Wisconsin visit the website of the Wisconsin AIDS/HIV Program at http://www.dhfs.state.wi.us/aids-hiv/index.htm.